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120°C by a liquid controller at a rate of between about 0.1 ml/min to 0.5 ml/min to form a precursor gases. The feed line is maintained at between about 80°C to 120°C, the deposition temperature is between about 380°C to 420°C, the deposition pressure is maintained at between about 0.5 torr to 5 torr, and the deposition time ranges from between about five minutes to thirty minutes, depending on the required TiO₂ thickness. TiO_x layer 28 may be, in the first embodiment of the method of the invention, plasma space etched, then annealed in an oxygen atmosphere to form a TiO₂ thin film. The structure is HF dipped to clean the surface of Iridium bottom electrode 20, resulting in the structure depicted in Fig. 4. The plasma space etching process for TiO_x thin film 22 includes setting TCP Rf power at about 370W and setting the bias power to about 130 W at a chamber pressure of about 5 torr. The etching chemicals used in the process include BCl₃ at a flow rate of about 30 sccm, and Cl₂ at a flow rate of about 58 sccm.

Fig. 5 depicts the structure following selective deposition of a ferroelectric thin film 24 30 by MOCVD. The upper surface of the FE and TiO_x extend above the level of the lastly deposited oxide layer because PGO may be selectively deposited on iridium and TiO₂, but will not form on SiO₂, therefor, the PGO will only be deposited on those areas which have exposed iridium and TiO₂.

Fig. 6 depicts the structure following CMP of ferroelectric thin film 30, surrounding TiO_x 28, and oxide 26.

Fig. 7 depicts the structure following deposition and annealing of a high-k oxide 32, deposition of a top electrode layer 34, and patterning and etching of the top electrode layer to form top electrodes 34.

Fig. 8 depicts the FeRAM constructed according to the first embodiment of the